CLAIMS

What is claimed is:

1.　　A method of creating a data sequence, comprising:

placing a training sequence at a beginning of a data frame;

5　　　　placing a plurality of the blocks of encoded data within the data frame following the training sequence; and

interspersing a plurality of submarkers within the encoded data blocks.

2.　　The method of claim 1 wherein the interspersing of the submarkers

10　comprises interspersing one of the submarkers between two encoded data blocks.

3.　　The method of claim 1 wherein the interspersing of the submarkers comprises interspersing each of the submarkers between different pairs of the encoded data blocks.

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4.　　The method of claim 1 wherein the interspersing of the submarkers comprises interspersing one of the submarkers within one of the encoded data blocks.

5.　　The method of claim 1 wherein the interspersing of the submarkers

20　comprises interspersing each of the submarkers within a different one of the encoded data blocks.

6.　　The method of claim 1 wherein the interspersing of the submarkers comprises copying at least a portion of the training sequence at the beginning of the

25　data frame, and interspersing the copied training sequence between one of the encoded data blocks.

7.　　The method of claim 1 wherein the interspersing of the submarkers comprises copying the training sequence at the beginning of the data frame, and

30　interspersing the copied training sequence between one of the encoded data blocks.

28

8.   The method of claim 1 wherein the interspersing of the submarkers comprises copying at least a portion of the training sequence at the beginning of the data frame, and interspersing the copied training sequence between each of the encoded data blocks.

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9.   The method of claim 1 wherein the interspersing of the submarkers comprises copying the training sequence at the beginning of the data frame, and interspersing the copied training sequence between each of the encoded data blocks.

10. A training sequence and submarker insertion apparatus, comprising:

an input adapted to receive a plurality of encoded data blocks; and

an inserter adapted to insert a training sequence before the encoded data blocks and insert a plurality of submarkers within the encoded data blocks thereby creating a

5   data frame.

11. The training sequence and submarker insertion apparatus of claim 10 wherein the input comprises an input queue.

10   12. The training sequence and submarker insertion apparatus of claim 11 wherein the input queue comprises a first-in-first-out storage device.

13. The training sequence and submarker insertion apparatus of claim 10 further comprising an output adapted to buffer the data frame.

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14. The training sequence and submarker insertion apparatus of claim 13 wherein the output comprises an output queue.

15. The training sequence and submarker insertion apparatus of claim 10

20   wherein the inserter is adapted to insert one of the submarkers between two encoded data blocks.

16. The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert each of the submarkers between different pairs

25   of the encoded data blocks.

17. The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert one of the submarkers within one of the encoded data blocks.

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18.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert each of the submarkers within a different one of the encoded data blocks.

5   19.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert at least a portion of the training sequence between one of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

10   20.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert the training sequence between one of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

15   21.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert at least a portion of the training sequence between each of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

20   22.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is adapted to insert the training sequence between each of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

25   23.   The training sequence and submarker insertion apparatus of claim 10 wherein the inserter is programmable as to the insertion of the submarkers within the encoded data blocks.

        24.   The training sequence and submarker insertion apparatus of claim 23
30   wherein the inserter is programmable to insert the submarkers between the encoded data blocks or insert the submarkers within the encoded data blocks.

25.   A training sequence and submarker insertion apparatus, comprising:

receiving means for receiving a plurality of encoded data blocks;

insertion means for inserting a training sequence before the encoded data

blocks and inserting a plurality of submarkers within the encoded data blocks thereby

5   creating a data frame.

26.   The training sequence and submarker insertion apparatus of claim 25

wherein the insertion means comprises an input queue.

10   27.   The training sequence and submarker insertion apparatus of claim 26

wherein the input queue comprises a first-in-first-out storage device.

28.   The training sequence and submarker insertion apparatus of claim 25

further comprising an output means for buffering the data frame.

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29.   The training sequence and submarker insertion apparatus of claim 28

wherein the output means comprises an output queue.

30.   The training sequence and submarker insertion apparatus of claim 25

20   wherein the insertion means comprises means for inserting one of the submarkers

between two encoded data blocks.

31.   The training sequence and submarker insertion apparatus of claim 25

wherein the insertion means comprises means for inserting each of the submarkers

25   between different pairs of the encoded data blocks.

32.   The training sequence and submarker insertion apparatus of claim 25

wherein the insertion means comprising means for inserting one of the submarkers

within one of the encoded data blocks.

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33. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for inserting each of the submarkers within a different one of the encoded data blocks.

5   34. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for inserting at least a portion of the training sequence between one of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

10   35. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for inserting the training sequence between one of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

15   36. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for inserting at least a portion of the training sequence between each of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

20   37. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for inserting the training sequence between each of the encoded data blocks in addition to inserting the training sequence at the beginning of the data frame.

25   38. The training sequence and submarker insertion apparatus of claim 25 wherein the insertion means comprises means for programming a position of the submarkers within the encoded data blocks.

39. The training sequence and submarker insertion apparatus of claim 25

30   wherein the insertion means comprises means for programming a position of the

submarkers to either insert the submarkers between the encoded data blocks or insert the submarkers within the encoded data blocks.

40. A method of creating a data sequence, comprising:

encoding data into a plurality of encoded data blocks;

creating a data frame comprising a first portion and a second portion, the first portion preceding the second portion in time;

placing a training sequence in the first portion of the data frame;

placing the encoded data blocks in the second portion of the data frame; and

interspersing a plurality of submarkers within the encoded data blocks.

41. The method of claim 40 wherein the interspersing of the submarkers comprises interspersing one of the submarkers between two encoded data blocks.

42. The method of claim 40 wherein the interspersing of the submarkers comprises interspersing each of the submarkers between different pairs of the encoded data blocks.

43. The method of claim 40 wherein the interspersing of the submarkers comprises interspersing one of the submarkers within one of the encoded data blocks.

44. The method of claim 40 wherein the interspersing of the submarkers comprises interspersing each of the submarkers within a different one of the encoded data blocks.

45. The method of claim 40 wherein the interspersing of the submarkers comprises copying at least a portion of the training sequence in the first portion of the data frame, and interspersing the copied training sequence between one of the encoded data blocks.

46. The method of claim 40 wherein the interspersing of the submarkers comprises copying the training sequence in the first portion of the data frame, and interspersing the copied training sequence between one of the encoded data blocks.

47.   The method of claim 40 wherein the interspersing of the submarkers comprises copying at least a portion of the training sequence in the first portion of the data frame, and interspersing the copied training sequence between each of the encoded data blocks.

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48.   The method of claim 40 wherein the interspersing of the submarkers comprises copying the training sequence in the first portion of the data frame, and interspersing the copied training sequence between each of the encoded data blocks.